tat. If only we could still go and see Moas being pursued by gigantic Haast's Eagles in the highlands of the South Island. For many species, the sense of loss is enhanced by it being illustrated alongside other native species that managed to stay out of the human's snares and rat's teeth.

The 58 species illustrated in this book are those that stood the test of taxonomic splitting and lumping that apparently also affects extinct taxa. For example, the New Zealand Swan and Pelican that featured in an earlier book (Gill & Martinson 1991) are now considered to have been conspecific with their Australian counterparts.

As the authors state in their introduction, the New Zealand avifauna offers an interesting chance to study the process of extinction. The introductory chapter documents what happened and which pest was responsible for which extinction. For a large part this is based on conjecture, but the authors nevertheless dismiss any role for other possible causes of extinction such as habitat loss or disease. The introduction leaves a lot of questions unanswered. For example, what is it about island life that makes these species so prone to extinction. In New Zealand even species that in other places are well-adapted to high predation risk, like Quail, got extinct. And what determined which species went extinct and which did not? Flightlessness is an obvious drawback when faced with vicious mammalian predators, but by no means all extinct birds were flightless. In fact, a glance at the extant avifauna of New Zealand doesn't reveal any obvious characteristic that is shared by the survivors. They appear to be an eclectic mix of species that were just a bit slow to get extinct (Kakapo and Takahe) and other typically eccentric species that look like they should have gone with the Moas, but which are doing just fine (Kea). Such idiosyncrasies also puzzle students of the great mass extinctions like the one that finished off the dinosaurs.

This is more than just a coffee-table book with pretty pictures to mesmerize over wonderful birds now gone. It should be a grim reminder of what rampant depletion of natural resources can do to us all. After all, when the Moas were gone the Maori found themselves with very little to eat and fell victim to widespread famine, war and cannibalism (Flannery 1994).

Flannery T. 1994. The Future Eaters: an ecological history of the Australasian lands and people. Reed New Holland, Sydney.

Gill B. & Martinson P. 1991. New Zealand's Extinct Birds. Random Century, Auckland.

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Camphuysen C.J. (ed) 2005. Understanding marine foodweb processes: an ecosystem approach to sustainable sandeel fisheries in the North Sea. IMPRESS Final Report, Royal Netherlands Institute for Sea Research, Texel. NIOZ report 2005–5. Can be downloaded from www.nioz.nl.

Sandeels provide food for a range of fish, marine mammal, and seabird species in the North Sea, so it is unsurprising that the huge, industrial fisheries on sandeels have been the topic of hot debates since they first developed in the 1950s. This has motivated several international research projects, and one of the biggest is the recently concluded, EU-funded IMPRESS project (Interactions between the Marine environment, PREdators, and prey: implications for Sustainable Sandeel fisheries). The final report of the IMPRESS project appeared in 2005. The book provides a synthesis of work in oceanography, fisheries science, but above all, seabird ecology. We, as seabird- and fish ecologist respectively, find it encouraging to see such integrative work, providing insight into an ecosystem all the way from lower trophic levels (i.e. plankton) to upper levels (i.e. seabirds). This is precisely the type of information that is essential for providing management advice on sandeel fisheries in an ecosystem context (cf. Frederiksen *et al.* 2006).

The 'principal study area' was a relatively small area of about 6000 km2 in SE Scotland, at the Firth of Forth, including the fishing grounds Wee Bankie, Marr Bank and Berwick Bank. An extended area of the northwestern North Sea around the principal study area was chosen as the 'study area at large', which covered almost 140 000 km^2. At these two different spatial scales, an extensive dataset was available from seabird at-sea surveys between 1991 and 2004. Between 1997 and 2003 fish biomass was sampled yearly in acoustic, trawl, grab and dredge surveys, not only for sandeels (mainly Lesser Sandeel *Ammodytes marinus*) but also for other fish species (herring etc.). Four seabird species were chosen as study species with different foraging styles and using different parts of the water column: the Northern Gannet *Morus bassanus*, European Shag *Phalacrocorax aristotelis*, Black-legged Kittiwake *Rissa tridactyla*, and Common Guillemot *Uria aalge*. From long-term monitoring programs on the Isle of May and Bass Rock (within the principal study area), colony counts and breeding success for these species were available between 1997 and 2003. Diet samples confirmed that sandeel was an important food item for these seabirds, especially for Kittiwakes and Shags. The report shows that too simple explanations between prey and predators should be avoided. For example, strong relationships of Kittiwake and Shag breeding success with sandeel availability were found. Unexpectedly, however, strong correlations were also found with herring abundance, a food item of negligible importance for both species. For Guillemots, breeding success was strongly correlated to Sprat Sprattus sprattus availability. But here density-dependent factors may have played a role too, because the breeding success declined over the study period, but the breeding population grew after the fishery had stopped in 2000.

Oceanographic data suggested that seven different regions could be distinguished based on bathymetry, productivity, stratification and tidal mixing, and the influence of freshwater. Apparently, shallow sea fronts are important areas for many foraging seabirds, because here most fish occur close to the surface. Some of the earlier data on foraging multi-species flocks were published in Ardea before (Camphuysen 1999) and get again much attention in this report. But for good reasons, we think, because still very little is known of grouping behaviour of animals at sea. Groups of Guillemots and Razorbills *Alca torda* herd schools of fish and drive them to the surface, making foraging more profitable for themselves, but also for surface-feeders like Kittiwakes and Gannets that are attracted by such foraging flocks. In a later stage, large gulls and skuas are alerted and are starting to interfere with these gatherings.

Foraging strategies were investigated in more detail with all sorts of dataloggers, not only to locate the feeding grounds, but also to record their behaviour at sea. Technological advancements go quickly in the field of foraging ecology of seabirds. Next to existing GPS-loggers, compass-loggers and VHF-transmitters, a special depth-temperature recorder was developed for IMPRESS. But not all birds liked the gadgets much, like the Kittiwakes that regurgitated these devices before they could be retrieved. The new foraging location data provided many new insights because the Isle of May/Bass Rock birds did not always forage at places where they were expected (based on at-sea observations). Guillemots were feeding closer than expected (on average 23 km from the colony) whereas Gannets were found up to West Norway. In IMPRESS, major advancements were achieved in getting estimations of the energetic requirements of foraging seabirds. In an experimental setup the behaviour and physiology of foraging seabirds were studied under different conditions (e.g. more or less prey). The experiments showed that hypothermia was not used as an energy-saving strategy during prolonged dives. Unfortunately, the efforts to extrapolate to population levels were not successful, as many parameters that are needed for the models are still lacking.

In IMPRESS the sustainability of the sandeel fishery was examined by looking at the ecosystem under basically two different levels of fishing pressure in different periods (relatively high fishery pressure in 1997 and 1998, and from 1999 to 2004 virtually no fisheries). Unfortunately, this time-series is still relatively short which makes it difficult to disentangle fisheries from other potential drivers of sandeel population dynamics. For approximately the same 'wider study area', Frederiksen *et al.* (2006) suggested that sandeel stock dynamics are not primarily driven by 'top-down' predation (either by natural predators or by fishing), but by other, 'bottom-up' drivers changing the ecosystem. These – likely climate-related – factors are changing plankton abundance and distribution, thereby affecting all higher trophic levels (Frederiksen *et al.* 2006). Moreover in 2004, after the main field activities for IMPRESS had stopped, most seabirds in Scotland showed a catastrophically poor breeding success. Interestingly, sandeel recruitment in 2003 was high and these events came rather unexpected. Guillemots were feeding their chicks at a normal rate, but with relatively 'low quality' food (sandeels and sprats with abnormally low energy content). Furthermore, sandeels were almost completely absent from their diet in this year (Wanless *et al.* 2004). Up to now, fishery has been suspended, but the question remains which level of sandeel fishing would be sustainable.

Finally, some critique could be given on an apparent mismatch between the project's title and actual coverage. Sandeel population dynamics, and sandeel fishing pressure, essentially are mainly viewed in a context of to what extent these may affect populations of seabirds. Really, seabirds are the main 'players' in the report but they are neither mentioned in the title of the project nor in the title of the final report. But sandeels are also important prey to several marine mammal and a rather long list of piscivorous fish species. It is the potential negative effects of the industrial fisheries on such commercially valuable species as Cod *Gadus morhua*, Haddock *Melanogrammus aeglefinus*, Plaice *Pleuronectes platessa* and Sole *Solea solea* that have been upsetting Dutch, British and other trawlermen for several decades now. Furthermore, it could be pointed out that the overwhelming majority of sandeel fishing, both nowadays and historically, occurs in more central parts of the North Sea out of reach of the study species when they are breeding (with the exception of Gannets). Hence, the current 'main' sandeel fishing grounds are relatively insignificant for (breeding) seabirds (e.g. Furness & Tasker 2000), and thus it could be questioned if relationships found at a relatively small scale close to the Scottish coast, apply to the North Sea ecosystem and North Sea sandeel fisheries in general.

The report is not a complete synthesis of all aspects of the North Sea ecosystem (although it may come close if we consider only the Wee Bankie region), but it is a highly informative update on the current knowledge of especially the higher trophic levels. Integration of all aspects that IMPRESS tried to tackle will probably take more time, especially the physiological and behavioural data in relation to the population and ecosystem level. Unlike many journal papers or book chapters, results that did not really work out the way the authors would have liked, are also shown in this report. We found it very refreshing to see these 'negative results' that are inevitable when progressing in science. The pages (240 in total, excluding the appendices that are given in the accompanying CD) are overloaded with graphs, tables, distribution charts and other details. This information is great for specialists working on seabirds in this area, but might be somewhat too much for the more general reader. Luckily, the report has a good summary and synthesis guiding the reader through all the information. Overall, an impressive piece of work, indeed.

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